

# Dewart Lake Vegetation Management Plan Update

Kosciusko County, Indiana

2006



<http://129.79.145.7/arcims/statewide%5Fmxd/viewer.htm>

Prepared for:

**The Dewart Lake Protective Association Inc.**

P.O. Box 152

Syracuse, Indiana 46567

Prepared by:

**Aquatic Weed Control**

P.O. Box 325

Syracuse, IN 46567

## Executive Summary

Two aquatic vegetation surveys were conducted on Dewart Lake in 2006. The first survey was conducted on May 18, 2006 and the second was conducted on August 10, 2006. The purpose of these surveys was to document any changes in the plant community from the 2005 survey, and to monitor both native and invasive plant populations before and after the whole lake fluridone treatment.

The entire lake was treated with Sonar (active ingredient: fluridone) on May 26, 2006. This treatment was designed to drastically reduce the Eurasian watermilfoil population and allow native plants to colonize areas where the milfoil was previously dominant. Two separate vegetation surveys were conducted on Dewart Lake in August of 2006 after the chemical treatments. One survey was conducted by District 3 Fisheries Biologist Jed Pearson. The other was conducted by Aquatic Weed Control. Eurasian watermilfoil was not found in either survey. The chemical treatment was successful in reducing the Eurasian watermilfoil to the point that it was undetectable in late summer of 2006.

The late season surveys showed slight reductions in species richness and species diversity, which is to be expected after the whole lake treatment. Besides Eurasian watermilfoil, the biggest reduction was seen in the slender naiad population, which is extremely susceptible to fluridone. The coontail population showed some damage from the fluridone, but was still found frequently (43.3 % site frequency).

Funding will be set aside to treat of areas of Eurasian watermilfoil (EWM) re-growth, although none is expected in 2007. No other herbicide treatments will be permitted on the main lake so that native plant populations can re-establish themselves. Aquatic vegetation surveys will also be conducted in 2007 to monitor both Eurasian watermilfoil and native plant populations.

### 2007 Cost Estimates

1. Chemically treat any areas of Eurasian watermilfoil re-growth.

*\*All cost figures are estimates only. All prices are subject to change pending 2007 chemical pricing.*

A. Treat 10 of EWM re-growth acres with Renovate \$ 5,000

B. No other herbicide treatments will take place on the main lake to allow native plant populations to establish themselves.

2. Conduct 2 Tier II aquatic vegetation surveys to monitor both invasive and native plant populations.

A. Spring and Late Season Vegetation Surveys and Plan Update \$ 4,000

### **Acknowledgements**

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## 1.0 Introduction

Dewart Lake has been involved in the Lake and River Enhancement Program (LARE) since 2005, when the first LARE funded aquatic vegetation survey took place on May 19, 2005. Based on the results of the 2005 surveys, a whole lake Sonar treatment was conducted in the following spring on May 26, 2006. The treatment was successful, and Eurasian milfoil was not found in the late season plant surveys of 2006. The following chart summarizes all LARE funded activities on Dewart Lake.

**Table 1: Dewart Lake LARE History**

Year	Action	Date	Funding Source
2005	Spring and Late Season Aquatic Vegetation Surveys	Spring Survey May 19, 2005	Lake and River Enhancement  Dewart Lake Protective Association
	Management Plan Development	Late Season Survey July 27, 2005	
2006	Whole Lake Sonar Treatment	Spring Survey May 18, 2006	Lake and River Enhancement  Dewart Lake Protective Association
	Aquatic Vegetation Surveys and Management Plan Update	Sonar Treatment May 26, 2006	
		Late Season Survey August 10, 2006	

## 2.0 Watershed and Lake Characteristics Update

(See 2005 Lake Management Plan)

Secchi disk readings remain moderate at Dewart Lake (usually around 8.0 feet). Water levels were unusually low during the summer of 2006. Lake residents estimated that the lake was between 1 and 3 feet below normal. This may have accounted for a slightly higher Sonar concentration than had been anticipated, since rate calculations for Sonar are based in part on average depth.

## 3.0 Lake Uses Update

Recreational use of Dewart Lake was improved for boaters and skiers during 2005 and 2006. Dense beds of Eurasian watermilfoil that had previously interfered with these activities were no longer a problem. Dense weedlines composed of Eurasian Watermilfoil that were once used by fishermen were also removed. This prompted concerns from some fishermen that too many weeds had been removed from the lake. A creel survey was conducted during the summer of 2006, and results from those interviews

should be available in 2007. It is hoped that native plants will take the place of the Eurasian watermilfoil, creating much better fish habitat in Dewart Lake.

## 4.0 Fisheries Update

A new fisheries survey was just conducted on Dewart Lake, and although the full report is not yet available, Jed Pearson provided the following species list (table 2), describing all of the fish populations collected in June of 2006 by the IDNR. A creel survey was also conducted in the summer of 2006, and those results should be available in 2007.

As more fisheries surveys are conducted in the future, it is hoped that the overall fish community will respond positively to the whole lake treatment. Future vegetation surveys should document changes in the plant community, and those changes can be evaluated in reference to changes in the fishery.

**Table 2: IDNR Fisheries Survey Data - June 2006**

<b>Relative Abundance, Size and Estimated Weight of Fish Collected at Dewart Lake (June 06)</b>						
			Minimum	Maximum		
Common Name*	Number	Percent	Length (in)	Length (in)	Weight (lb)**	Percent
Bluegill	790	51.9	1.7	8.5	56.09	15.1
Mimic chiner	224	14.7	2.0	2.5	0.12	0.0
Redear	121	8.0	4.1	11.3	38.57	10.4
Largemouth bass	118	7.8	3.3	17.5	47.87	12.9
Yellow perch	85	5.6	2.8	10.1	8.64	2.3
Northern pike	37	2.4	15.0	32.1	88.20	23.8
Warmouth	27	1.8	3.0	8.5	5.03	1.4
Rock bass	23	1.5	2.2	10.8	7.28	2.0
Yellow bullhead	17	1.1	7.0	13.1	9.71	2.6
Brook silverside	16	1.1	3.3	4.0	0.04	0.0
Spotted gar	14	0.9	11.0	39.8	30.24	8.2
Bowfin	8	0.5	21.1	24.8	37.21	10.0
brown bullhead	8	0.5	7.1	14.0	6.55	1.8
Logperch	7	0.5	3.1	4.6	0.03	0.0
Longear	7	0.5	2.6	4.8	0.31	0.1
Black crappie	5	0.3	11.2	12.3	4.37	1.2
Walleye	5	0.3	17.7	24.0	15.50	4.2
Lake chubsucker	4	0.3	4.0	6.5	0.42	0.1
Banded killifish	3	0.2	1.7	2.2	0.01	0.0
Smallmouth bass	2	0.1	4.2	15.7	1.99	0.5
Carp	1	0.1	30.3		12.35	3.3
TOTAL	1522				370.53	

## 5.0 Problem Statement

Eurasian watermilfoil no longer dominates the Dewart Lake plant community. The challenge in 2007 will be to prevent rapid re-growth of Eurasian watermilfoil. Proper surveying, identification of areas of re-growth, and effective spot treatments should help suppress Eurasian watermilfoil.

## 6.0 Management Goals and Objectives

The management goals outlined by the IDNR Division of Fish and Wildlife have not changed. They are restated below:

1. Develop or maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality and is resistant to minor habitat disturbances and invasive species.
2. Direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species.
3. Provide reasonable public recreational access while minimizing the negative impacts on plant and wildlife resources.

The major objective for Dewart Lake has changed from a large scale treatment effort to reduce the dominant milfoil population, to smaller scale treatments in areas where re-growth is observed in the future.

## 7.0 Plant Management History Update

### 7.1 2006 Sonar Treatment

Dewart Lake was treated with Sonar (active ingredient: fluridone) on May 26, 2006. The amount of Sonar needed to reach a concentration of 6 ppb in Dewart Lake was calculated using the following formula.

Quarts of Sonar = (Total Acres) x (Avg. Depth of Treatment Site) x (0.0027) x (desired concentration)

A total of 28 gallons of Sonar were applied throughout Dewart Lake. The lake was divided into 4 quadrants with equal amounts of herbicide being applied in each quadrant. GPS waypoints were used to ensure adequate coverage of the heaviest Eurasian watermilfoil beds, but sonar was also distributed in deeper water as well to reduce the potential for “hot spots” which is a small area with a very high concentration of fluridone. The application was completed using 2 boats, each equipped with an underwater high pressure injection system.

Six water samples (FasTESTs) were collected on June 14, and sent to Sepro (manufacturer of Sonar) to determine the concentration of Sonar in Dewart Lake. The concentration of sonar in Dewart Lake averaged 2 parts per billion higher than the expected concentration of 6 parts per billion. The low water levels observed at Dewart Lake during the summer of 2006 may help account for the difference between the theoretical and the actual Sonar concentration, as calculations are based on average depth. FasTEST results from Dewart Lake are included (Figure 1).

No second application (“bump”) was needed to maintain a concentration of 6ppb at Dewart Lake.

Figure 1: 2006 FasTEST Results

Cooperator:		Aquatic Weed Control Inc.				Phone:		Fax:	
Jim Donahoe		P.O. Box 325				(574) 533-2597		(574) 534-8230	
Territory:		Syracuse IN 46567-							
Sample	Date(s) Treated	Sonar	Date Collected	Rate Applied	Acres Treated	Sample Location Description	Results PPF		
1.	05/25/06	A.S.	6/9/2006	6	551	1	11.7		
2.						2	8.4		
3.						3	7.3		
4.						4	7.0		
5.						5	7.4		
6.						6	7.0		
7.									
8.									
9.									
10.									
Depth Sample Collected:		2'		Date Sample Received:		6/14/2006			
Storage Conditions:		Refrigerated		Condition of Sample(s) Box/Water Containers:		Excellent			
Date Shipped to SePRO:		6/13/2006		Date Analysis was Performed:		6/15/2006			
How would you like results sent to you?		Fax		ju		Regular Mail		No	
Date Results Sent to Cooperator:		6/15/2006							
<b>Back of Data Sheet</b>					<b>Back of Data Sheet</b>				
Name of Waterbody:					Dewart Lake				
Average Depth in Feet:					12				
Size of Waterbody in Acres:					551				
Target Plant(s) to Control:					Eurasian watermilfoil				

## 8.0 Aquatic Plant Community Characterization Update

Two major changes have been adopted in LARE protocol that change the process of characterizing the plant community of Indiana lakes.

The first change is the switch from 2 Tier II surveys each year to just one Tier II survey per year. Prior to 2006, both a Tier I and a Tier II survey were required in both spring and late season. This year's protocol changed to require a Tier I survey each spring, and A Tier II survey if the late season, accompanied by a Tier I late season survey to document any changes in the to plant community from spring to late season.

The second change is in the formation of a new Tier II protocol. These changes are outlined in the methods section (8.1).

## 8.1 Methods Update

The Tier II survey protocol was changed by the IDNR in 2006. New LARE Tier II protocol requires that sample sites be stratified by depth contour. Prior to 2006 sites were to be spaced evenly through the littoral zone.

Before 2006, the number of sample sites required each lake were determined strictly by lake size. In the 2006 protocol, the number of sample sites needed is based on both lake size and trophic state. Trophic state describes the productivity of a lake and is correlated with plant growth, secchi disk, and nutrient availability. There are 4 different trophic states listed by the IDNR: Oligotrophic, Mesotrophic, Eutrophic, and Hypereutrophic. Oligotrophic Lakes usually have clear water and few nutrients, while Hypereutrophic lakes usually have deeply stained water and are nutrient rich. Table 3 is taken from the IDNR 2006 Tier II protocol and shows the maximum depth that must be sampled for a lake in each trophic state. In oligotrophic lakes, where water is clear, plants may be able to grow in up to 25 feet of water because sunlight may still reach the lake bottom in deep water. In hypereutrophic lakes where water is turbid, lack of sunlight will prevent plants from growing in deep water, so the maximum sampling depth is only 10 feet.

**Table 3: Sample Depth by Trophic State**

Trophic State	Maximum Depth of Sampling (ft)
Hypereutrophic	10
Eutrophic	15
Mesotrophic	20
Oligotrophic	25

Table 4 is used to calculate the number of sample sites need in each depth contour by using lake size and trophic status. The new protocol attempts to more accurately describe the entire littoral zone of a lake and provide more detailed data analysis by separating the littoral zone into 5 foot depth segments.

**Table 4: Sample Sites by Lake Size and Trophic State**

Tier II Sampling														
3														
Table 3. Sample size requirements as determined by lake size, trophic state, and apportioned by depth class.														
Lake Acres	Total # of Sites	Hypereutrophic		Eutrophic			Mesotrophic				Oligotrophic			
		0-5 foot contour	5-10 foot contour	0-5 foot contour	5-10 foot contour	10-15 foot contour	0-5 foot contour	5-10 foot contour	10-15 foot contour	15-20 foot contour	0-5 foot contour	5-10 foot contour	10-15 foot contour	15-20 foot contour
<10	20	10	10	10	7	3	10	5	3	2	10	4	3	2
10-49	30	20	10	10	10	10	10	10	7	3	10	10	5	3
50-99	40	30	10	17	13	10	10	10	10	10	10	10	10	7
100-199	50	40	10	23	17	10	14	14	12	10	10	10	10	10
200-299	60	50	10	30	20	10	18	16	16	10	14	12	12	10
300-399	70	60	10	37	23	10	22	20	18	10	17	15	14	10
400-499	80	70	10	43	27	10	25	23	22	10	19	18	17	10
500-799	90	80	10	50	30	10	29	27	24	10	22	21	19	10
≥800	100	90	10	57	33	10	33	31	26	10	25	23	22	10



### 8.2.1 Tier I Results

The submersed plant community of Dewart Lake covers roughly 260 acres, or 47% of the lake's total surface area. Approximately 140 of these acres (shown in red in figure 2) are covered mainly with chara and have low abundances of other plants. Areas of the littoral zone that have no plants are virtually non-existent although there are areas where vegetation is scarce. These sparsely covered areas occur on large shallow flats located on unprotected areas of the main lake. Weed growth on these shallow flats may be inhibited by substrate, wave action, and other unknown factors. More dense plant beds (shown in blue and green in figure 2) cover roughly 120 acres of the lake (21%). These weed beds are found near the deeper edge of the littoral zone, as well as in near shore areas of more protected bays with softer, mud bottoms. Maximum depth of these plant beds is approximately 17 feet. Eurasian milfoil was found predominantly in these heavier weed beds in spring of 2006 and is frequently found intermingled with native species.

The bays in the southwest, southeast, and northeast corners of the lake differ from most of the other plant beds in the lake. They are typically more diverse and vegetative growth is usually more dense in these areas. While near shore areas on the main lake are largely covered by chara, near shore areas in the bays are more likely to harbor dense beds of Eurasian milfoil, coontail, curly leaf pondweed, and other macrophytes. Bottom content appears to have a much higher organic content than most main lake weed beds, especially in the bays where plant bed #6 and plant bed #9 are found. This may account for the higher diversity and the more dense plant growth in these areas.

#### **Problem Plant Areas:**

The major problems caused by invasive species were found in the plant beds along the drop off near the deep edge of the littoral zone. These are plant beds #1, #3, #4, #6, #8, and #11 (Figure 2). Although Eurasian milfoil is present in many of the shallower beds, it is usually found in low abundance, and its spread may be limited by areas of heavy chara growth. Together the beds with dense Eurasian milfoil beds cover approximately 113 acres. This is approximately 43% of the total area covered by submersed aquatic vegetation, and 21% of the lake's total surface area. These beds will be monitored closely to determine if native plants can take the place of Eurasian watermilfoil in the years to come.

#### **Beneficial Plant Areas:**

One of the most important plant areas on Dewart Lake is the large section of emergent plants along the south shore (Emergent Beds #3, #4, and #5). The estimated area of coverage for these significant wetlands is 51 acres. Plants like soft stem bulrush, white lilies, spatterdock, arrowhead, and cattails are present in these beds. According to J.F. New's 2005 study, only 5% of Dewart Lake's total watershed was covered with wetlands. The benefits of wetlands are well documented, and the protection of the small amount of wetland areas in the Dewart Lake watershed should be a high priority. Of special concern are the bulrushes that are sparsely scattered along the south shore's large shallow flat (emergent bed #5, 2005 AVMP) and two small patches of soft stem bulrushes in the northwest section of the lake (emergent bed #12, 205 AVMP). These bulrush beds may be decreasing in size due to disturbance caused by boats. It is

recommended that the lake association work with the IDNR to protect these vulnerable areas in Dewart Lake.

Other beneficial plant areas include the wetland section surrounding the lake's main inlet (Cable Run) at the southeast end of the lake (emergent bed #10, 2005 AVMP). This emergent bed provides filtration for the lake's main source of nutrients and sediment. The bay at the northeast end of the lake containing emergent bed #11 and submersed plant bed #9 is also a beneficial plant area. It is one of the few sections of Dewart Lake that is not developed, contains a significant wetland, and contained 8 different native submersed plant species, although Eurasian milfoil and curly leaf pondweed were present as well.

During the 2006 Tier I surveys, 12 major plant beds were identified, with few changes since 2005. The composition of these plant beds changed significantly from May to August, due to the Sonar treatment. The amount of biomass in all of these beds decreased from May to late August, especially in the off shore beds containing Eurasian watermilfoil. Populations of most plants decreased slightly after treatment, with the exceptions of waterstargrass and chara. Table 5 is a summary of the major plant beds found in Dewart Lake.

Table 5: Dewart Lake 2006 Plant Bed Summary

## Dewart Lake 2006 Tier I Submersed Plants

Species Abundance by Plant Bed #

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12
<b>Plant Species</b>												
American Pondweed					2				2	1		
Chara	2	4	2	2	4	1	4	1	3	4	1	2
American Elodea			1						2			
Illinois Pondweed		2		2	1	1	1	1	1	1	1	1
Eurasian Milfoil	4	2	4	4	1	4	1	4	3	2	4	3
Slender Naiad	2	2			1	2	2			1		2
Flat-stemmed Pondweed		1			1	2	1			1		
Whorled Watermilfoil									1			
Sago Pondweed			1		1	1			1	2	2	
Largeleaf Pondweed						1		1	1	1		
Eelgrass		1				1	1					
Curly-Leaf Pondweed			1	1	1	3	2	2	2		1	1
Coontail	2	1	1	2		1	1	2	1			
<b>Total # of Species</b>	<b>4</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>10</b>	<b>8</b>	<b>5</b>	<b>5</b>
<b>Size (Acres)</b>	<b>17</b>	<b>3</b>	<b>5</b>	<b>36</b>	<b>64</b>	<b>16</b>	<b>12</b>	<b>14</b>	<b>11</b>	<b>58</b>	<b>25</b>	<b>2</b>

**Plant Bed #1**

Size: 17 acres

Substrate: Sand/Silt

Number of Species: 4

**Description:** This plant bed is a narrow band of vegetation that lies close to the drop off along the west end of the lake and extends north near public access site. In spring it was composed primarily of Eurasian milfoil (>60%), which is highly visible from the boat, although rake throws revealed coontail, chara, and slender naiad below the canopy, all with much lower coverage areas (2-20%).

**Plant Bed #2**

Size: 3 acres

Substrate: Sand/Gravel

Number of Species: 7

**Description:** This bed is located in the bay at the southwest end of the lake. In this near shore bed, chara was the dominant species (>60%), with some naiad and Illinois pondweed present. Moderately heavy stands of Eurasian milfoil were also found in spring, although they were not as prevalent in this near shore bed as they were in the deeper water of the same bay. Flat-stemmed pondweed, eelgrass, and coontail were all found in very low abundance (<2%). Eurasian watermilfoil and slender naiad were not found in the late season.

**Plant Bed #3**

Size: 5 acres

Substrate: Sand/Silt

Number of Species: 6

**Description:** This plant bed is located near the drop off in the bay at the southwest corner of the lake, adjacent to plant bed #2. It had primarily the same species as plant bed #2 but abundances were different. In this deeper water, Eurasian milfoil accounted for over 60% of the area. Chara was not as dominant in this bed, and American elodea was also found in this bed.

**Plant Bed #4**

Size: 36 acres

Substrate: Sand/Silt

Number of Species: 5

**Description:** This plant bed runs along the drop off along the majority of the south shore of the Dewart Lake. It is similar in structure to plant bed #1 and also similar in composition. Eurasian milfoil was prevalent (>60%) in this narrow band of plants. This seemed to be an increase from 2005. Chara and Illinois pondweed were found with 2-20% abundances, while coontail and curly leaf pondweed were found with very low abundances (<2%). Eurasian milfoil was not found in this bed after treatment, and some coontail plants showed some damage.

**Plant Bed #5**

Size: 64

Substrate: Sand/Gravel

Number of Species: 8

**Description:** This plant bed covers the large shallow flat along the south shore of Dewart Lake and was the largest plant bed recorded in the survey. It contained 8 species of plants. Chara was by far the most dominant plant in this bed (>60%). Eurasian milfoil was present but scarce in this bed (<2%), most likely due to the thick patches of chara growth, along with the shallow depths of this bed. American pondweed was present with an abundance of 2-20% while Illinois pondweed, slender naiad, flat-stemmed pondweed, sago pondweed, and curly leaf pondweed were all present in low abundance (<2%).

**Plant Bed #6**

Size: 16 acres

Substrate: Silt/Clay

Number of Species: 10

**Description:** This plant bed forms a ring around the shoreline of the bay at the southeast end of the lake. It was a very diverse bed containing 10 species. The bottom substrate was significantly more silted than other sections of the lake, and the bay also contains the main inlet to the lake (Cable Run Ditch). These two factors might facilitate the abundant plant growth that was found there. Eurasian milfoil was extremely abundant in the spring (<60%), and may have become even more prevalent since 2005. Curly leaf pondweed was also abundant in spring (>20%), but had decreased as well in the late season survey, probably as a result of natural die off and chemical treatment. Large leaf pondweed was found sparingly in both the spring and late season surveys. Slender naiad and flat-stemmed pondweed both had abundances of between 2 and 20% in spring. Chara, Illinois pondweed, sago pondweed eelgrass and coontail were all found in low abundance (<2%).

**Plant Bed #7**

Size: 12 acres

Substrate: Sand/Gravel

Number of Species: 8

**Description:** This plant bed runs along the shore of the eastern section of the lake. It is very similar in structure and composition to plant beds 2, and 5. Although 8 species of plants were recorded, the vast majority of this bed is dominated by chara. Curly leaf pondweed was moderately abundant in the spring (21-60%) and decreased in the July survey. Flat-stemmed pondweed and slender naiad were found with abundances between 2 and 20%. Illinois pondweed, Eurasian milfoil, eelgrass, and coontail were all found in low abundance (<2%).

**Plant Bed #8**

Size: 14 acres

Substrate: Sand/Silt

Number of Species: 6

**Description:** This plant bed runs along the drop off adjacent to plant bed #7. It is a narrow but dense plant bed composed primarily of Eurasian milfoil (>60%). Many other

species are found only by conducting supplementary rake throws that help to identify weeds growing under the milfoil canopy. Coontail and curly leaf pondweed had abundances between 2 and 20%, while chara, Illinois pondweed, and largeleaf pondweed all had low abundances (<2%). The Sonar treatment removed Eurasian milfoil from this bed in the late season survey.

### **Plant Bed #9**

Size: 11 acres

Substrate: Silt/Clay

Number of Species: 10

**Description:** This bed was one of the two most diverse plant beds in Dewart Lake. Eurasian milfoil and chara were the most dominant plants in spring with abundances of 21 to 60%. Chara was found in very dense patches with rake scores of 4 and 5, although it was not found throughout the entire bed. Eurasian milfoil was much the same, with a few dense patches. American pondweed, American elodea, and curly leaf pondweed were also found in some dense patches, although overall coverage was much less than chara and Eurasian milfoil. Illinois pondweed, sago pondweed, largeleaf pondweed, and coontail were all found in low abundances (<2%). This was also the only plant bed in which whorled watermilfoil was found. Its abundance was low as well (<2%).

### **Plant Bed #10**

Size: 58 acres

Substrate: Sand/Gravel/Rock

Number of Species: 8

**Description:** Plant bed #10 is the second largest bed in Dewart Lake at 58 acres. This near shore bed is extremely long and covers almost the entire northwest section of the lake. It is similar in composition to plant beds #2, #5, and #7. Although 8 plant species were found in this bed, chara was by far the dominant species (~80%). Eurasian milfoil and Sago pondweed both occurred with abundances between 2 and 20%, while American pondweed, Illinois pondweed, slender naiad, flat-stemmed pondweed, and largeleaf pondweed were present but scarce (<2%).

### **Plant Bed #11**

Size: 25 acres

Substrate: Sand/Silt

Number of Species: 5

**Description:** This bed is located in the deeper water of the large shallow flat that runs along the north shore of Dewart Lake. It contains some of the heaviest milfoil beds in the lake. Eurasian milfoil was dominant in spring (>60%) and formed a dense canopy over many areas of the bed. From the surface only Eurasian milfoil and sago pondweed were visible, although supplementary rake throws revealed that some chara and curly leaf pondweed were present beneath the canopy (2-20%) along with Illinois pondweed (<2%).



### **Plant Bed #12**

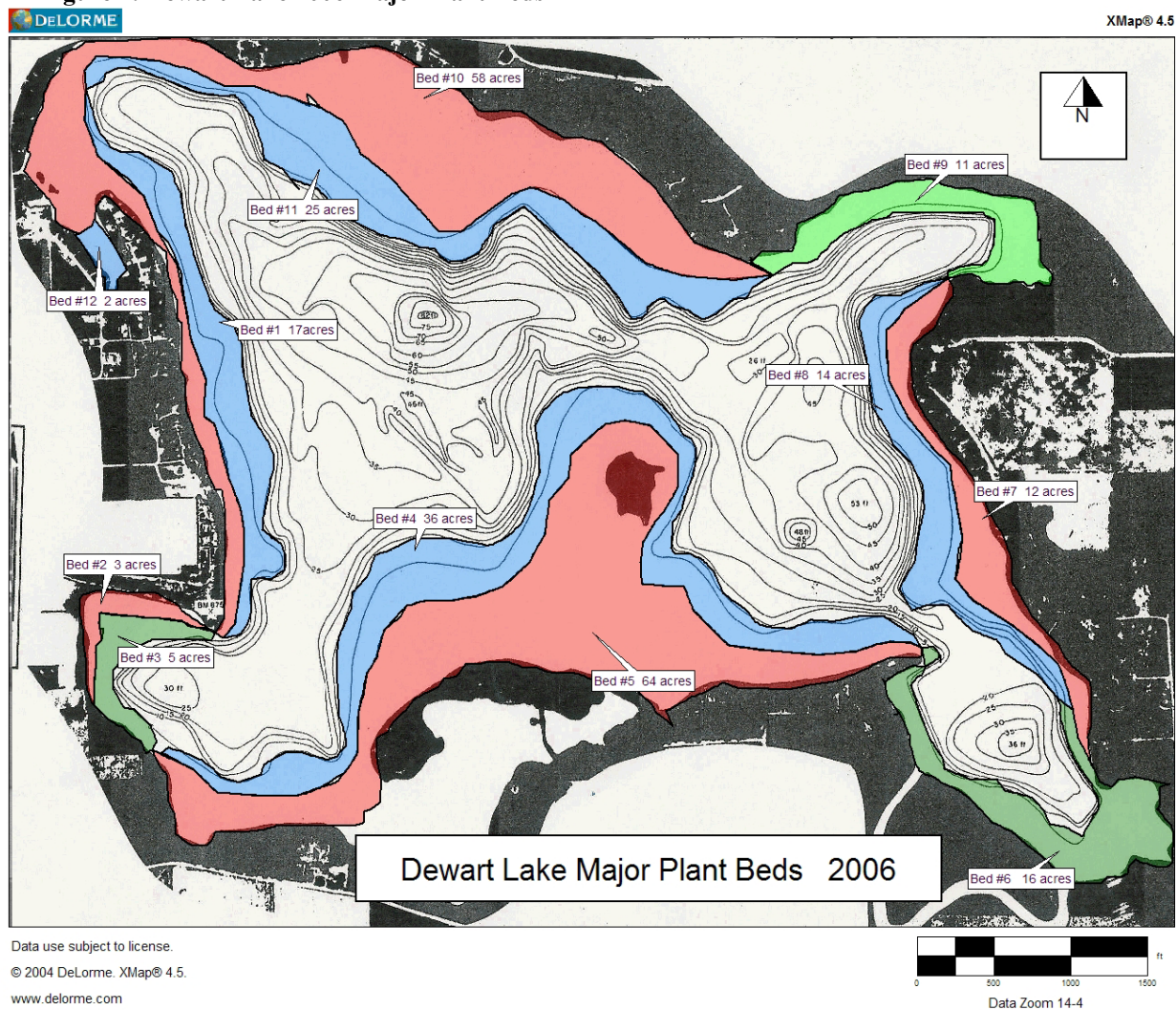
Size: 2 acres

Substrate: Sand/Silt

Number of Species: 5

**Description:** This plant bed is located in the small bay adjacent to the public access site. Although it contains a large amount of chara, its composition seemed more consistent with plant beds #1, #4, #8, and #11. Eurasian milfoil beds were present in spring (~20%), though not as dense as many of the main lake plant beds. Slender naiad was present (2-20%) while chara, Illinois pondweed, and curly leaf pondweed were present with low abundances (<2%). Eurasian watermilfoil and slender naiad were not found in late season 2006.

**Figure 2: Dewart Lake 2006 Major Plant Beds**

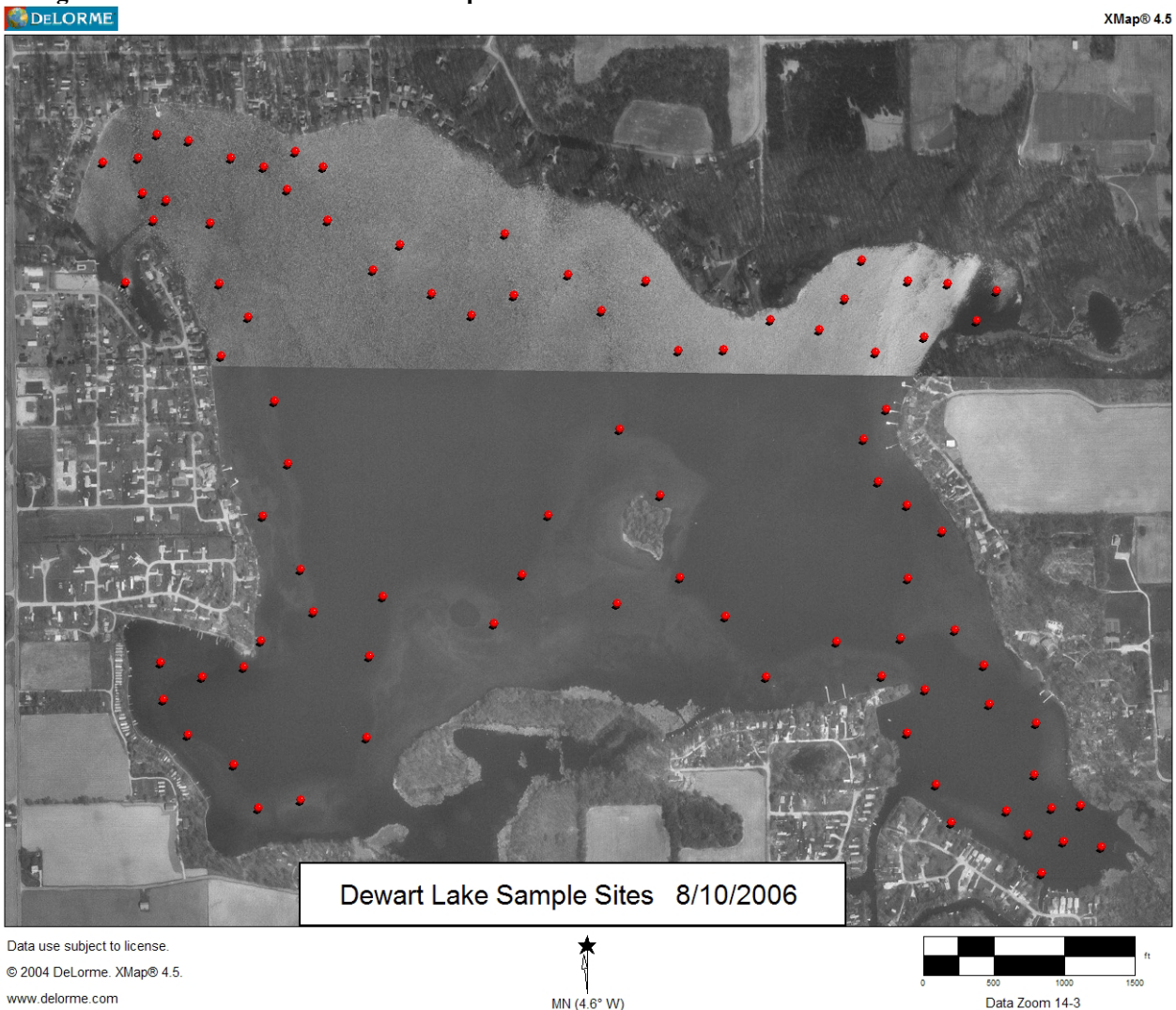




## 8.2.2 Tier II Results

Secchi depth was estimated at 8 feet in the 2006 Tier II survey. Based on Dewart Lake's classification as mesotrophic and its 551 surface acres, ninety rake samples were distributed throughout each 5 foot depth contour of the littoral zone. A total of 11 species of submersed aquatic plants were collected during this survey. Curly leaf pondweed was the only invasive plant found in this survey. The following map shows the locations of all sample sites during the 2006 Tier II survey. Sample sites differ from 2005, reflecting the change in Tier II protocol for 2006.

**Figure 3: Dewart Lake 2006 Tier II Sample Sites**



## Tier II Data Analysis

Tables 6 through 10 are data summaries for the 2006 aquatic vegetation survey. These tables help to describe the plant community, and will help identify any changes that take place in the years to come. Table 6 includes every sample site in the survey, While the other tables describe each 5 foot depth contour of the lake's littoral zone (0-5 feet, 5-10 feet, etc).

**Table 6: Late Season 2006 Data Analysis : All Sites**

Occurrence and Abundance of Submersed Aquatic Plants					
Date:	8/10/06	Littoral sites with plants:	75	Species diversity:	0.77
Littoral depth (ft):	20.0	Number of species:	11	Native diversity:	0.74
Littoral sites:	90	Maximum species/site:	5	Rake diversity:	0.68
Total sites:	90	Mean number species/site:	1.18	Native rake diversity:	0.67
Secchi:	8.0	Mean native species/site:	1.10	*Mean rake score:	2.99
Common Name	Site frequency	Rel. Freq.	Relative density	Mean density	Dominance
Coontail	43.3	36.8	1.14	2.64	22.9
Chara	33.3	28.3	1.47	4.40	29.3
Waterstargrass	11.1	9.4	0.29	2.60	5.8
Curly-leaf Pondweed	7.8	6.6	0.08	1.00	1.6
American Pondweed	4.4	3.8	0.04	1.00	0.9
Illinois Pondweed	4.4	3.8	0.04	1.00	0.9
Sago Pondweed	4.4	3.8	0.07	1.50	1.3
Large-leaf Pondweed	3.3	2.8	0.10	3.00	2.0
Flat-stemmed Pondweed	2.2	1.9	0.02	1.00	0.4
Nitella	2.2	1.9	0.09	4.00	1.8
Eel Grass	1.1	0.9	0.01	1.00	0.2

**Table 7: Late Season 2006 Data Analysis: 0-5 Foot Depth Contour**

Occurrence and Abundance of Submersed Aquatic Plants					
Date:	8/10/06	Littoral sites with plants:	28	Species diversity:	0.66
Littoral depth (ft):	5.0	Number of species:	8	Native diversity:	0.65
Littoral sites:	29	Maximum species/site:	5	Rake diversity:	0.36
Total sites:	29	Mean number species/site:	1.45	Native rake diversity:	0.35
Secchi:	8.0	Mean native species/site:	1.41	*Mean rake score:	4.00
Common Name	Site frequency	Relative density	Mean density	Dominance	
Chara	79.3	3.55	4.48	71.0	
Coontail	20.7	0.34	1.67	6.9	
American Pondweed	10.3	0.10	1.00	2.1	
Illinois Pondweed	10.3	0.10	1.00	2.1	
Flat-stemmed Pondweed	6.9	0.07	1.00	1.4	
Large-leaf Pondweed	6.9	0.14	2.00	2.8	
Sago Pondweed	6.9	0.14	2.00	2.8	
Curly-leaf Pondweed	3.4	0.03	1.00	0.7	

**Table 8: Late Season 2006 Data Analysis: 5-10 Foot Depth Contour**

Occurrence and Abundance of Submersed Aquatic Plants					
Date:	8/10/06	Littoral sites with plants:	27	Species diversity:	0.72
Littoral depth (ft):	10.0	Number of species:	9	Native diversity:	0.70
Littoral sites:	27	Maximum species/site:	3	Rake diversity:	0.70
Total sites:	27	Mean number species/site:	1.44	Native rake diversity:	0.69
Secchi:	8.0	Mean native species/site:	1.37	*Mean rake score:	3.30
Common Name	Site frequency	Relative density	Mean density	Dominance	
Coontail	66.7	1.70	2.56	34.1	
Waterstargrass	25.9	0.70	2.71	14.1	
Chara	22.2	0.89	4.00	17.8	
Curly-leaf Pondweed	7.4	0.07	1.00	1.5	
Sago Pondweed	7.4	0.07	1.00	1.5	
American Pondweed	3.7	0.04	1.00	0.7	
Eel Grass	3.7	0.04	1.00	0.7	
Illinois Pondweed	3.7	0.04	1.00	0.7	
Large-leaf Pondweed	3.7	0.19	5.00	3.7	

**Table 9: Late Season 2006 Data Analysis: 10-15 Foot Depth Contour**

Occurrence and Abundance of Submersed Aquatic Plants						
Date:		8/10/06	Littoral sites with plants:	17	Species diversity:	0.58
Littoral depth (ft):		15.0	Number of species:	5	Native diversity:	0.43
Littoral sites:		24	Maximum species/site:	3	Rake diversity:	0.51
Total sites:		24	Mean number species/site:	0.96	Native rake diversity:	0.45
Secchi:		8.0	Mean native species/site:	0.79	*Mean rake score:	2.38
Common Name	Site frequency	Relative density	Mean density	Dominance		
Coontail	58.3	1.83	3.14	36.7		
Curly-leaf Pondweed	16.7	0.17	1.00	3.3		
Waterstargrass	12.5	0.29	2.33	5.8		
Chara	4.2	0.21	5.00	4.2		
Nitella	4.2	0.21	5.00	4.2		

**Table 10: Late Season 2006 Data Analysis: 15-20 Foot Depth Contour**

Occurrence and Abundance of Submersed Aquatic Plants					
Date:	8/10/06	Littoral sites with plants:	3	Species diversity:	0.50
Littoral depth (ft):	20.0	Number of species:	2	Native diversity:	0.50
Littoral sites:	10	Maximum species/site:	1	Rake diversity:	0.50
				Native rake	
Total sites:	10	Mean number species/site:	0.20	diversity:	0.50
Secchi:	8.0	Mean native species/site:	0.20	*Mean rake score:	0.70
Common Name	Site frequency	Relative density	Mean density	Dominance	
Coontail	10.0	0.30	3.00	6.0	
Nitella	10.0	0.30	3.00	6.0	

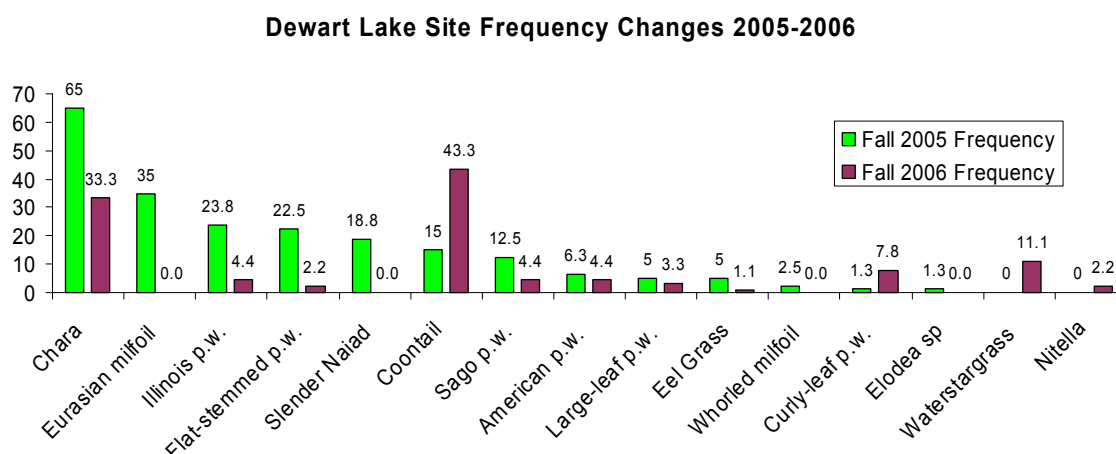
## Site Frequency

Site frequency is a measure of how often a species was collected during the Tier II survey. It can be calculated by the following equation:

$$\text{Site Frequency} = \frac{(\# \text{ of sites where the species was collected})}{\text{Total \# of littoral sample sites}} \times 100$$

Table 11 shows site frequencies for every plant collected in fall 2005 (pre-treatment) or fall 2006 (post treatment). Chara was the most frequently collected species in late season of 2005. Chara was frequently collected in late season 2006 as well, although a change in protocol lowers its representation in the data. Eurasian milfoil was the second most frequently collected plant in 2005, and was not found in 2006. Coontail frequency increased dramatically from 2005 to 2006 which also likely reflects the change to taking more sample sites in deep water, where coontail grows.

**Table 11: 2005-2006 Site Frequencies**



## Mean Density and Relative Density

Mean Density is a measure the abundance of a species in areas where it is growing. For example, a species can have a high site frequency, but still have a very low mean density. This means that a species may be prevalent throughout an entire lake, but it may also be sparsely scattered. Mean density can be calculated using the following equation:

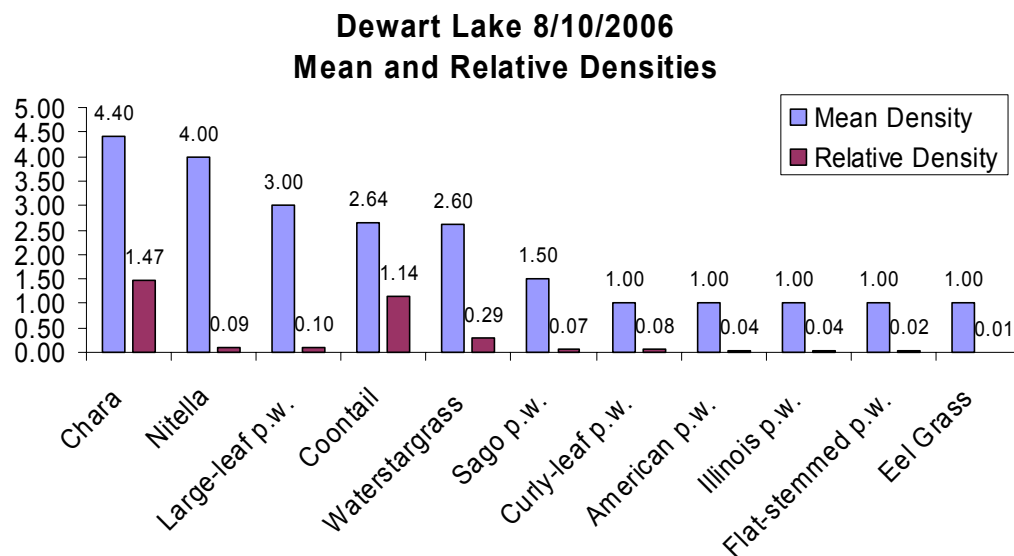
$$\text{Mean Density} = \frac{(\text{The sum of all rake scores for a species})}{(\text{Total \# of sites where the species was collected})}$$

Relative Density is calculated much like mean density, only in this case, the sum of the rake scores for a species is divided by the total number of sample sites in the survey. Unless a species was collected at every sample site, the relative density will always be smaller than the mean density.

$$\text{Relative Density} = \frac{(\text{The sum of all rake scores for a species})}{(\text{Total \# of littoral sample sites})}$$

Table 12 shows mean and relative densities for each plant found in the late season 2006 Tier II survey. Chara had the greatest mean density and the greatest relative density because it was frequently collected. Coontail was fourth in mean density, but second in relative density because it was so frequently collected. Nitella had a high mean density, but very low relative density because it was not frequently collected.

**Table 12: Late Season 2006 Mean and Relative Densities**



## Species Diversity

The species diversity indices listed in tables 6 -10 help to describe the overall plant community. A species diversity index is actually measured as a value of uncertainty (H). If a species is chosen at random from a collection containing a certain number of species, the diversity index (H) is the probability that a chosen species will be different from the previous random selection. The diversity index (H) will always be between 0 and 1. The higher the H value, the more likely it is that the next species chosen from the collection at random will be different from the previous selection (Smith, 2001). This index is dependent upon species richness and species evenness, meaning that species diversity is a function of how many different species are present and how evenly they are spread throughout the ecosystem.

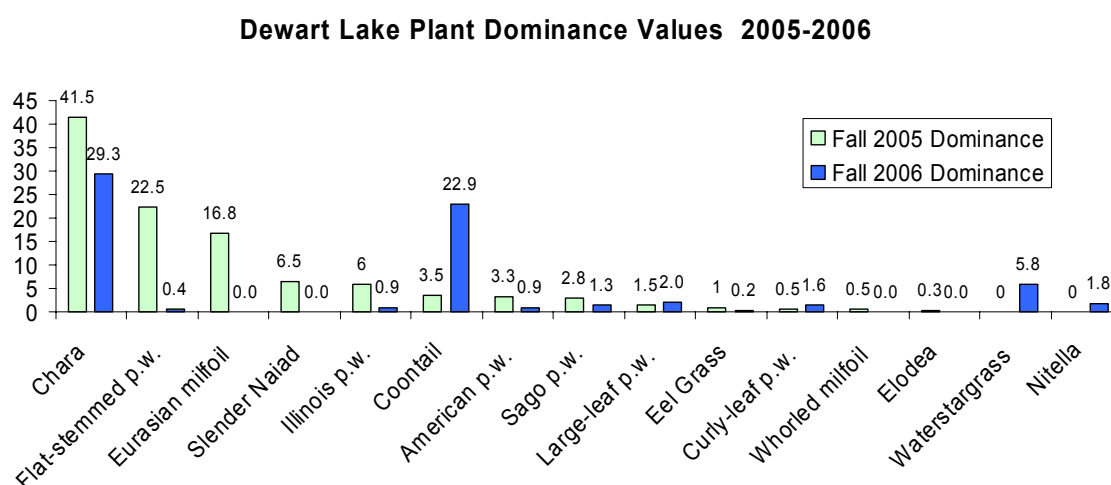
The overall species diversity index for Dewart Lake in late season 2006 was 0.77. Native plant diversity in late season of 2006 was less than the overall species diversity at 0.74, meaning that an invasive species (curly leaf pondweed) accounted for some of the diversity in Dewart Lake. Rake diversity and native rake diversity were measured at 0.68 and 0.67 respectively in late season 2006.

## Species Dominance

Species dominance is dependent upon how many times a species occurs, and its relative coverage area or biomass within the system. In this survey, the abundance rating given to each species at each sample site was used to determine dominance. The dominance of a particular species in this Tier II survey increases as its site frequency and relative abundance increase.

Table 13 tracks dominance values for each plant collected at Dewart Lake during its involvement in the LARE program. Trends are similar to sight frequency, with Eurasian watermilfoil and slender naiad dominances dropping sharply after the Sonar treatment. Coontail dominance increased greatly from late season 2005 to late season 2006.

**Table 13: 2004-2006 Plant Dominance**



## Relative Frequency of Occurrence

Relative frequency of occurrence is a measure of how often a plant is collected in relation to all of the other plants collected in a Tier II survey. It is demonstrated with the following equation:

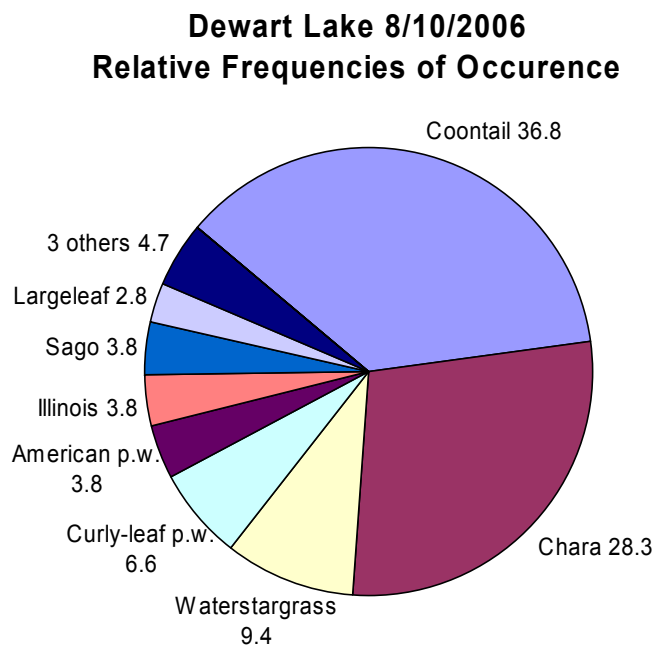
$$\text{Relative Freq. of Occurrence} = \frac{\text{The site Frequency for a species}}{\text{The sum of all site frequencies including the species in question}} \times 100$$

The sum of all relative frequency of occurrence values will always add up to 100. For this reason it is displayed in a pie graph.

Figure 4 shows relative frequency of occurrence values for each plant collected in the late season 2006 survey. Coontail had the greatest relative frequency at 28.6, while chara also had a high relative frequency 28.4. Waterstargrass was next at 9.4 followed by curly leaf pondweed at 6.6. Seven other species had relative frequencies of 3.8 or less.



**Figure 4: Dewart Lake Relative Frequencies of Occurrence**



### 8.3 Macrophyte Inventory Discussion

The submersed plant community of Dewart Lake covers roughly 260 acres of the lake, or 47% of the lake's total surface area. Eurasian watermilfoil was dominant in about 140 of these acres before the Sonar treatment. After treatment, Eurasian watermilfoil was reduced to the point that it was undetectable in 2 late season vegetation surveys conducted by both the IDNR and Aquatic Weed Control. Slight reductions were seen in overall species richness and plant diversity, and populations of some native plants were reduced. These changes are expected and native plant populations should recover strongly in 2007. It is hoped that these natives will start to grow in areas previously dominated by Eurasian watermilfoil.

In summary, Dewart Lake is characterized by a moderately diverse plant community (11 species) relatively clear water (secchi depth ~8.0 ft.) a wide spread distribution of chara and other native plants. Eurasian watermilfoil was not found after the 2006 whole lake Sonar treatment and is not expected to return to the lake in any great abundance in 2007.

### 9.0 Aquatic Vegetation Management Alternatives

(See 2005 Lake Management Plan)

Major Eurasian watermilfoil control practices have not changed significantly from the 2005 Alternatives.

## 10.0 Public Involvement

A LARE meeting was held on October 31, 2006 to discuss issues pertaining to Dewart Lake. District 3 Fisheries Biologist Jed Pearson, lake representatives, Aquatic Weed Control and LARE Aquatic Biologist Angela Sturdevant were all present and discussed the plant community of Dewart Lake.

A public lake meeting was held for Dewart Lake on June 11, 2006, after the Sonar treatment. Thirty people were in attendance. Jim Donahoe of Aquatic Weed Control summarized LARE management activities and outlined the future management strategy for maintaining the Eurasian watermilfoil population at a low level.

Residents were very happy that the Eurasian watermilfoil was responding favorably to the treatment, but also very concerned about possible damage to emergent vegetation. In June, some spatterdock and lilies were showing “browning” as a result of the treatment. This browning was only temporary and emergent vegetation recovered fully as the summer progressed.

A summary of responses to the public questionnaire are included in Table 14.

Table 14: Public Questionnaire Data

Total: 30

Lake Use Survey Lake name Dewart Lake

Are you a lake property owner? Yes 27 No 1

Are you currently a member of your lake association? Yes 28 No 0

How many years have you been at the lake? 2 or less - 0  
2 - 5 years - 3  
5-10 years - 4  
Over 10 years - 22

How do you use the lake (mark all that apply)

<u>22</u> Swimming	<u>8</u> Irrigation
<u>27</u> Boating	<u>1</u> Drinking water
<u>25</u> Fishing	<u>0</u> Other _____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 20 No 9

Do you currently participate in a weed control project on the lake? Yes 15 No 11

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 24 No 5

Does the level of vegetation in the lake affect your property values? Yes 12 No 10

Are you in favor of continuing efforts to control vegetation on the lake? Yes 27 No 2

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes 28 No 2

Mark any of these you think are problems on your lake:

<u>9</u>	Too many boats access the lake
<u>14</u>	Use of jet skis on the lake
<u>0</u>	Too much fishing
<u>1</u>	Fish population problem
<u>9</u>	Dredging needed
<u>12</u>	Overuse by nonresidents
<u>18</u>	Too many aquatic plants
<u>1</u>	Not enough aquatic plants
<u>1</u>	Poor water quality
<u>2</u>	Pier/funneling problem

Please add any comments:

too many bass tournaments; dredging needed at ramp and  
also by public access; more law enforcements - only a few are a  
nuisance - mostly weekend property owners; Skiing, Speeding  
in shallow water - especially inwards; fishing contest needs monitored;  
Septic systems, lawn fertilizers, large boats - 30' plus;  
property owners applying chemicals in lake; need lake  
patrol; septic systems; too many large boats - yachts;

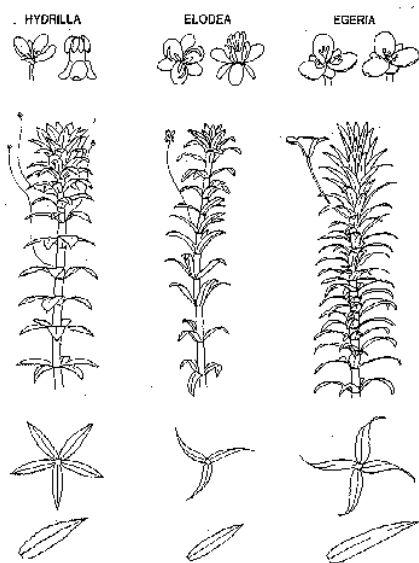
## 11.0 Public Education

### 11.1 Hydrilla

Hydrilla (*Hydrilla verticillata*) is an invasive aquatic plant species common throughout the southern United States. It is federally listed as a noxious weed and causes severe ecological and recreational problems wherever it grows. It is considered to be much more destructive than other invasives like Eurasian watermilfoil and curly leaf pondweed because of its reproductive adaptations. It grows by fragmentation, as does Eurasian watermilfoil, but it also produces turions which can remain dormant in the sediment for 4 years or more (Van and Steward, 1990). It produces tubers at its root tips which can also reproduce after multiple years of dormancy. It can grow 1 inch each day and it quickly out-competes native plants. It forms dense beds that eliminate native plants, stunt fish populations, impede recreation and cause a drastic decrease in biodiversity (Colle and Shireman, 1980). Millions of dollars are spent each year for hydrilla maintenance each year in



Florida alone. Eradication is unlikely once a population has been well established, although eradication has been achieved in newly infested waters using a herbicide called



Sonar. Sonar is applied at a rate of 6 parts per billion and this concentration is maintained in the water for 180 days. Early detection can be crucial to an effective eradication program, and all lake residents and users are encouraged to be on the look-out for this invader.

In fall of 2006, this plant was found in Lake Manitou, in Rochester, Indiana. This is the first instance of hydrilla in the upper Midwest. Prior to its appearance in Lake Manitou, The closest infestations of hydrilla were in Tennessee and Pennsylvania.

Hydrilla can easily be confused with native elodea. The major difference is that elodea has sets of leaves on the stem in whorls of three, while hydrilla usually has whorls of 5 leaves, although 4 to 9 leaves per

whorl are possible with hydrilla. Hydrilla will also have small serrations on the leaf edges. More information on hydrilla can be found at the University of Florida's Center for Aquatic Invasive Plants (<http://plants.ifas.ufl.edu/>). More general information on aquatic invaders can be found at [www.protectyourwaters.net](http://www.protectyourwaters.net).

## 12.0 Integrated Management Action Strategy

Any areas of Eurasian watermilfoil re-growth should be treated with Renovate herbicide (active ingredient: triclopyr) in 2007. No significant re-growth is expected in 2007 based on previous records from other Sonar treatments. A vegetation control permit will be submitted without a treatment map for 2007, since no re-growth has occurred to this point. If Eurasian watermilfoil returns to the lake in 2007, it will be detected in the vegetation surveys, and spot treatments using Renovate would be used to control the milfoil. Renovate is recommended over 2,4-D for spot treatments, as it has shown the ability to provide 2 years of control in some situations. However, 2 years of control for spot treatments is not expected. Maintenance of the Eurasian watermilfoil population should be the highest priority. Spot treatments should be limited to areas of Eurasian watermilfoil infestation to protect the native species that are re-colonizing the lake. Treatment of native plants along shorelines of the main lake will not be permitted in 2007. This should give the native plants a competitive advantage over Eurasian watermilfoil.

## 13.0 Project Budget

2. Chemically treat any areas of Eurasian watermilfoil re-growth.

*\*All cost figures are estimates only. All prices are subject to change pending 2007 chemical pricing.*

A. Treat 10 of EWM re-growth acres with Renovate \$ 5,000

B. No other herbicide treatments will be permitted on the main lake to allow native plant populations to establish themselves.

3. Conduct 2 Tier II aquatic vegetation surveys to monitor both invasive and native plant populations.

A. Spring and Late Season Vegetation Surveys and Plan Update \$ 4,000

## 14.0 Monitoring and plan Update Procedures

Dewart Lake will be intensely surveyed in 2007. Aquatic Weed Control will conduct 2 Tier II aquatic vegetation surveys (spring and late season). These surveys should help to detect any areas of Eurasian watermilfoil re-growth. They will also document changes in the native plant community, as well as provide more data on the response of plant populations to whole lake Sonar treatments.

## 15.0 References

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## 16.0 Appendices

### 16.1 Calculations

Fluridone Calculations:

The following paragraph is taken directly from the Sonar A.S. label. It outlines the specific procedures for calculating the amount of Fluridone needed to treat a body of water.

#### **Application Rate Calculation - Ponds, Lakes and Reservoirs**

The amount of Sonar A.S. to be applied to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:

Quarts of Sonar A.S. required per treated surface acre =  
 Average water depth of treatment site (feet)  
 x Desired ppb concentration of active ingredient  
 x 0.0027

For example, the quarts per acre of Sonar A.S. required to provide a concentration of 25 ppb of active ingredient in water with an average depth of 5 feet is calculated as follows:

$5 \times 25 \times 0.0027 = 0.33$  quarts per treated surface acre  
 When measuring quantities of Sonar A.S., quarts may be converted to fluid ounces by multiplying quarts to be measured x 32. For example,  $0.33 \text{ quarts} \times 32 = 10.5$  fluid ounces.

**Note:** Calculated rates should not exceed the maximum allowable rate in quarts per treated surface acre for the water depth listed in the application rate table for the site to be treated.

## 16.2 Common Aquatic Plants of Indiana

(See 2005 Dewart Lake Management Plan)

### 16.3 Pesticide Use Restrictions Summary:

The following table was produced by Purdue University and included in the Professional Aquatic Applicators Training Manual. It gives a summary of water use restrictions on all major chemicals available for use in the aquatics market.

**Table 15: Pesticide Use Restrictions**

Table 1. Aquatic Herbicides and Their Use Restrictions. Always check the label because these restrictions are subject to change.

	Human			Animal	Irrigation		
	Drinking	Swimming	Fish Consumption	Drinking	Turf	Forage	Food Crops
----- <i>waiting period, in days</i> -----							
Copper Chelate	0	0 <sup>a</sup>	0	0	0	0	0
Copper Sulfate	0	0 <sup>a</sup>	0	0	0	0	0
Diquat	1-3	0 <sup>a</sup>	0	1	1-3	1-3	5
Endothall (granular) <sup>b</sup>	7	0 <sup>a</sup>	3	0	7	7	7
Endothall (liquid) <sup>b</sup>	7-25	0 <sup>a</sup>	3	7-25	7-25 <sup>d</sup>	7-25	7-25
Endothall 191 (granular) <sup>c</sup>	7-25	0 <sup>a</sup>	3	7-25	7-25	7-25	7-25
Endothall 191 (liquid) <sup>c</sup>	7-25	0 <sup>a</sup>	3	7-25	7-25	7-25	7-25
Fluridone	0 <sup>e</sup>	0 <sup>a</sup>	0	0	7-30	7-30	7-30
Glyphosate	0 <sup>e</sup>	0 <sup>a</sup>	0	0	0	0	0
2,4-D (granular)	*	0 <sup>a</sup>	0	*	*	*	*

<sup>a</sup>Although this compound has no waiting period for swimming, it is always advisable to wait 24 hours before permitting swimming in the direct area of treatment.

<sup>b</sup>Trade name is Aquathol®.

<sup>c</sup>Trade name is Hydrothol®.

<sup>d</sup>May be used for sprinkling bent grass immediately.

<sup>e</sup>Do not apply this product within 1/4 (fluridone) to 1/2 (glyphosate) mile upstream of potable water intakes.

\*Do not use treated water for domestic purposes, livestock watering (2,4-D, dairy animals only), or irrigation.

## 16.4 Resources for Aquatic Management

In addition to the LARE Program, there are many other sources of potential funding to help improve the quality of Indiana Lakes. Many government agencies assist in projects designed to improve environmental quality.

The USDA has many programs to assist environmental improvement. More information on the following programs can be found at [www.usda.gov](http://www.usda.gov).

Watershed Protection and Flood Prevention Program (USDA)

Conservation Reserve Program (USDA)

Wetlands Reserve Program (USDA)

Grassland Reserve Program (USDA)

Wildlife Habitat Incentive Program (USDA)

Small Watershed Rehabilitation Program (USDA)

The following programs are offered by the U.S. Fish and Wildlife Service. More information about the Fish and Wildlife service can be found at [www.fws.gov](http://www.fws.gov)

Partners for Fish and Wildlife Program (U.S. Fish and Wildlife Service)

Bring Back the Natives Program ( U.S. Fish and Wildlife Service)

Native Plant Conservation Program (U.S. Fish and Wildlife Service)

The Environmental Protection Agency, the Indiana Department of Environmental Management, and the U.S. Forest Service also have numerous programs for funding. A few of these are listed below. More information can be found at [www.in.gov/idem](http://www.in.gov/idem) and [www.fs.fed.us/](http://www.fs.fed.us/)

U.S. Environmental Protection Agency Environmental Education Program (EPA)

NPDES Related State Program Grants (IDEM)

Community Forestry Grant Program (U.S. Forest Service)

## 16.5 State Regulations for Aquatic Plant Management

The following information is found on the IDNR website and outlines general regulations for the management of aquatic plants in public waters.

### AQUATIC PLANT CONTROL PERMIT REGULATIONS

Indiana Department of Natural Resources

Note: In addition to a permit from IDNR, public water supplies cannot be treated without prior written approval from the IDEM Drinking Water Section. **Amended state statute adds biological and mechanical control (use of weed harvesters) to the permit requirements, reduces the area allowed for treatment without a permit to 625 sq ft, and updates the reference to IDEM. These changes become effective on July 1, 2002.**

#### Chapter 9. Regulation of Fishing

##### IC 14-22-9-10

Sec. 10. (a) This section does not apply to the following:

- (1) A privately owned lake, farm pond, or public or private drainage ditch.
- (2) A landowner or tenant adjacent to public waters or boundary waters of the state, who chemically, mechanically, or physically controls aquatic vegetation in the immediate vicinity of a boat landing or bathing beach on or adjacent to the real property of the landowner or tenant if the following conditions exist:

- (A) The area where vegetation is to be controlled does not exceed:
  - (i) twenty-five (25) feet along the legally established, average, or normal shoreline;
  - (ii) a water depth of six (6) feet; and
  - (iii) a total surface area of six hundred twenty-five (625) square feet.
- (B) Control of vegetation does not occur in a public waterway of the state.

(b) A person may not chemically, mechanically, physically, or biologically control aquatic vegetation in the public waters or boundary waters of the state without a permit issued by the department. All procedures to control aquatic vegetation under this section shall be conducted in accordance with rules adopted by the department under IC 4-22-2.

(c) Upon receipt of an application for a permit to control aquatic vegetation and the payment of a fee of five dollars (\$5), the department may issue a permit to the applicant. However, if the aquatic vegetation proposed to be controlled is present in a public water supply, the department may not, without prior written approval from the department of environmental management, approve a permit for control of the aquatic vegetation.

(d) This section does not do any of the following:

- (1) Act as a bar to a suit or cause of action by a person or governmental agency.
- (2) Relieve the permittee from liability, rules, restrictions, or permits that may be required of the permittee by any other governmental agency.
- (3) Affect water pollution control laws (as defined in IC 13-11-2-261) and the rules adopted under water pollution control laws (as defined in IC 13-11-2-261).

As added by P.L.1-1995, SEC.15. Amended by P.L.1-1996, SEC.64.

#### 312 IAC 9-10-3 Aquatic vegetation control permits

Authority: IC 14-22-2-6; IC 14-22-9-10

Affected: IC 14-22-9-10

Sec. 3. (a) Except as provided under IC 14-22-9-10(a), a person shall obtain a permit under this section before applying a substance to waters of this state to seek aquatic vegetation control.

(b) An application for an aquatic vegetation control permit shall be made on a departmental form and must include the following information:

- (1) The common name of the plants to be controlled.
- (2) The acreage to be treated.
- (3) The maximum depth of the water where plants are to be treated.
- (4) The name and amount of the chemical to be used.

(c) A permit issued under this section is limited to the terms of the application and to conditions imposed on the permit by the department.

(d) Five (5) days before the application of a substance permitted under this section, the permit holder must post clearly, visible signs at the treatment area indicating the substance that will be applied and what precautions should be taken.

(e) A permit issued under this section is void if the waters to be treated are supplied to the public by a private company or governmental agency. (*Natural Resources Commission*; 312

## 16.6 Public Input Questionnaire

Table 16: Public Questionnaire

Total: 30

Lake Use Survey Lake name Dewart Lake

Are you a lake property owner? Yes 27 No 1

Are you currently a member of your lake association? Yes 28 No 0

How many years have you been at the lake? 2 or less - 0  
2 - 5 years - 3  
5-10 years - 4  
Over 10 years - 22

How do you use the lake (mark all that apply)

<u>22</u> Swimming	<u>8</u> Irrigation
<u>27</u> Boating	<u>1</u> Drinking water
<u>25</u> Fishing	<u>0</u> Other _____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 20 No 9

Do you currently participate in a weed control project on the lake? Yes 15 No 11

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 24 No 5

Does the level of vegetation in the lake affect your property values? Yes 12 No 10

Are you in favor of continuing efforts to control vegetation on the lake? Yes 27 No 2

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes 28 No 2

Mark any of these you think are problems on your lake:

<u>9</u>	Too many boats access the lake
<u>14</u>	Use of jet skis on the lake
<u>0</u>	Too much fishing
<u>1</u>	Fish population problem
<u>9</u>	Dredging needed
<u>12</u>	Overuse by nonresidents
<u>18</u>	Too many aquatic plants
<u>1</u>	Not enough aquatic plants
<u>1</u>	Poor water quality
<u>2</u>	Pier/funneling problem

Please add any comments:

too many bass tournaments; dredging needed at ramp and  
also by public access; more law enforcements - only a few are a  
nuisance - mostly weekend property owners; Skiing, Speeding  
in shallow water - especially inwards; fishing contest needs monitored;  
Septic Systems, lawn fertilizers, large boats - 30 plus;  
property owners applying chemicals in lake; need lake  
patrol; septic systems; too many large boats - yachts;



## 16.7 Species Distribution Maps

\*Rake scores for each sample site included

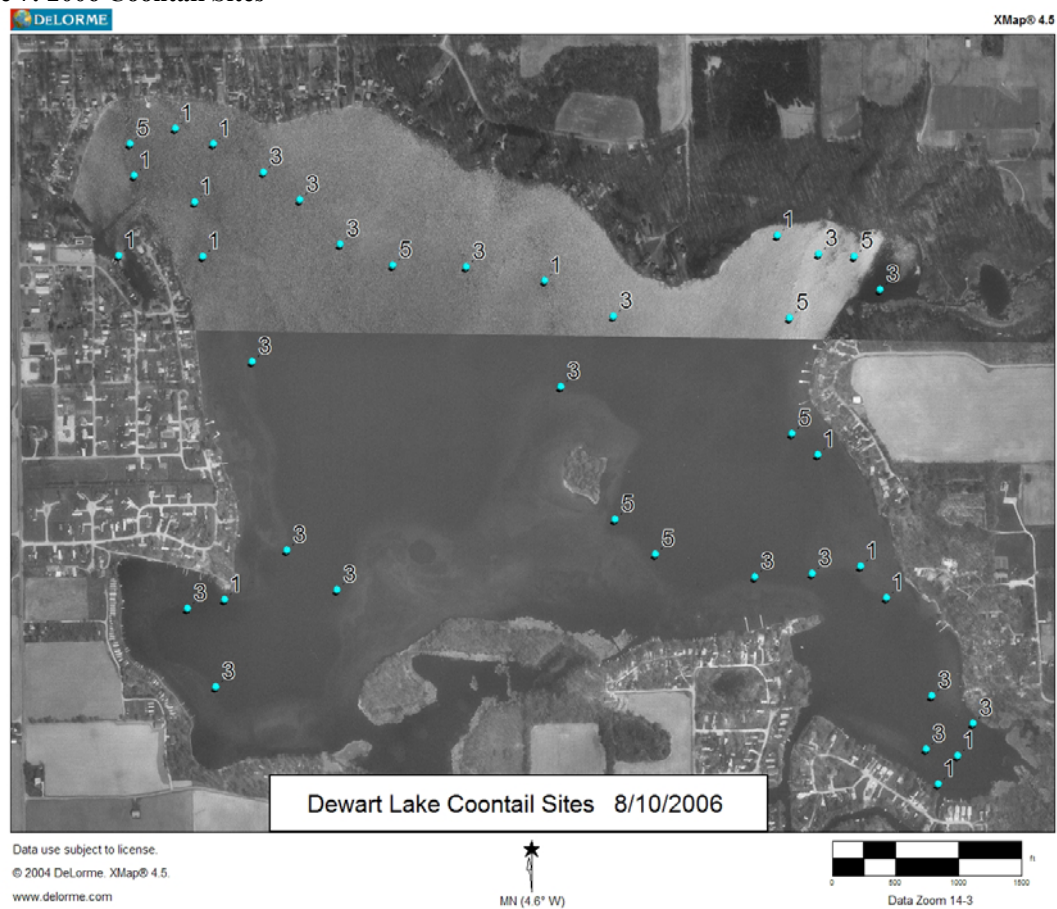
Figure 5: 2006 American Pondweed Sites







Figure 7: 2006 Coontail Sites



**Figure 8: 2006 Curly Leaf Pondweed Sites**

**Figure 9: 2006 Eelgrass Sites**

Figure 10: 2006 Flat-stemmed Pondweed Sites





Figure 11: 2006 Illinois Pondweed Sites





**Figure 12: 2006 Largeleaf Pondweed Sites**

Figure 13: 2006 Nitella Sites



Figure 14: 2006 Sago Pondweed Sites



Figure 15: 2006 Waterstargrass Sites



## 16.8 Data Sheets

Table 17: 2006 Tier II Data Sheet #1

Submersed Aquatic Plant Survey Form

Page 1 of 3<sup>11</sup>

WATER BODY NAME <u>DeWart Lake</u>				SECCHI <u>8.4</u>								
COUNTY <u>Kosciusko</u>				MAX PLANT DEPTH <u>20 (17)</u>								
DATE <u>August 10, 2006</u>				WEATHER <u>Mostly cloudy, calm</u>								
CREW LEADER <u>Dave</u>				COMMENTS <u>milkweed</u>								
RECORDER <u>Dave</u>				29 0-5	27 5-10	24 10-15	10 15-20					
Rake score (1, 3, 5), observed only (9), algae present (p) Use acronyms for species, V1, V2...for voucher codes								Note				
Species Code												
Site	Latitude	Longitude	Depth	All	PORE	CENE	CHAD	LARGE	ZODU	Nitela	POIL	MSPL
1			3	3	3	1						
2			3	5			5					
3			8	5		1	5					
4			12	1		1						
5			17	1								
6			4	5			5					
7			7	3		3						
8			12	0								
9			3	5			5					
10			6	5			5					
11			14	3		3						
12			2	5			5	3				
13			6	1		1			1			
14			11	3		3						
15			1	5			5					
16			8	5			5					
17			17	3						3		
18			12	5		3				5		
19			3	5			5					
20			2	5			5				1	
21			6	4	1		5					
22			12	3		3						
23			18	0								
24			2	5			5					
25			9	3	1				3			
26			13	0								
27			3	5			5					
28			8	3		3	1		1			
29			3	5			5					
30			13	5		5						
31			10	5		5						
32			3	5			5				1	

Other plant species observed at lake

0-5 17  
5-10 13  
10-15 10  
15-20 5



Table 18: 2006 Tier II Data Sheet #2

Submersed Aquatic Plant Survey Form

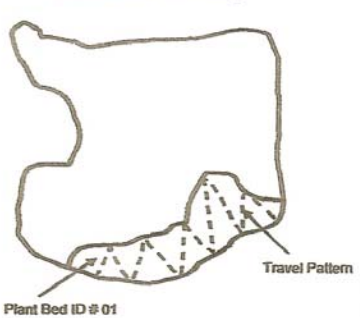
Page 2 of 3<sup>11</sup>

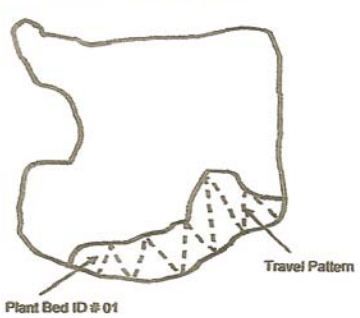
WATER BODY NAME <i>Devart Lake</i>		SECCHI <i>8 ft</i>	
COUNTY <i>Kosciusko</i>		MAX PLANT DEPTH <i>20 (17)</i>	
DATE <i>August 10, 2006</i>		WEATHER <i>mostly cloudy calm, low</i>	
CREW LEADER <i>Dave</i>		COMMENTS	
RECORDER <i>Dave</i>			
Rake score (1, 3, 5), observed only (9), algae present (p) Use acronyms for species, V1, V2...for voucher codes			
Note			
Species Code			
Site	Latitude	Longitude	Depth
33			9 3
34			3 5
35			9 1
36			13 0
37			20 0
38			2 1
39			7 5
40			11 3
41			3 3
42			9 1
43			3 0
44			3 3
45			19 0
46			11 3
47			12 1
48			16 0
49			10 1
50			4 5
51			9 5
52			12 0
53			4 3
54			7 1
55			11 5
56			17 0
57			2 3
58			8 5
59			12 0
60			4 3
61			6 5
62			17 5
63			16 3
64			4 5
Other plant species observed at lake			

A Flat  
P P P P P P  
Flat 1



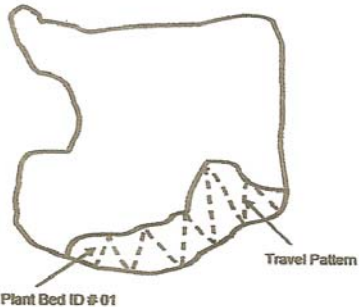


Aquatic Vegetation Plant Bed Data Sheet						Page <u>1</u> of <u>12</u>
State of Indiana Department of Natural Resources						
ORGANIZATION: <u>Dewar Lake Protective Assoc.</u>				DATE: <u>May 18, 2006</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>52</u>	Waterbody Name: <u>Dewar Lake</u>			Center of the Bed		
Bed Size: <u>17 acres</u>	Waterbody ID: <u>4</u>			Latitude: <u>N41 22.266</u>	Longitude: <u>W85 46.853</u>	
Substrate: <u>3</u>	Total # of Species: <u>4</u>			Max. Lakeward Extent of Bed		
Marl? <u>0</u>	Canopy Abundance at Site			Latitude: <u>N41 23.307</u>	Longitude: <u>W85 46.830</u>	
High Organic? <u>1</u>	S: <u>4</u>	M: <u>-</u>	F: <u>-</u>	E: <u>-</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;">Individual Plant Bed Survey</div> 	
<u>NYSP2</u>	<u>4</u>					
<u>CFDE4</u>	<u>2</u>				<div style="border: 1px solid black; height: 150px; width: 100%;"></div> <div style="margin-top: 10px;">Comments:</div>	
<u>CH3PA</u>	<u>2</u>					
<u>NAFL</u>	<u>2</u>					
REMEMBER INFORMATION						
Substrate:	Marl	Canopy:	QE Code:	Reference ID:		
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or		
2 = Silt w/ Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific		
3 = Sand w/ Silt		3 = 21-60%	2 = Genus suspected	location of a species;		
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map		
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
Overall Surface Cover		Abundance:	Voucher:			
N = Nonrooted floating		1 = < 2%	0 = Not Taken			
F = Floating, rooted		2 = 2-20%	1 = Taken, not verified			
E = Emergent		3 = 21-60%	2 = Taken, verified			
S = Submersed		4 = > 60%				

Aquatic Vegetation Plant Bed Data Sheet					Page 2 of 12	
State of Indiana Department of Natural Resources						
ORGANIZATION: <u>Deer Creek Lake</u>				DATE: <u>5/18/06</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>52</u>	Waterbody Name: <u>Deer Creek Lake</u>			Center of the Bed		
Bed Size: <u>3 acres</u>				Latitude: <u>N41 22.029</u>		
Substrate: <u>3</u>	Waterbody ID: <u>8</u>			Longitude: <u>W85 47.014</u>		
Marl? <u>0</u>	Total # of Species <u>8</u>			Max. Lakeward Extent of Bed		
High Organic? <u>1</u>	Canopy Abundance at Site			Latitude: <u>N41 22.016</u>		
	S: <u>4</u>	F: <u>-</u>	E: <u>-</u>	Longitude: <u>W85 47.011</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	Individual Plant Bed Survey 	
CHADA	4					
MYSP2	2					
NAFL	2					
DOPL	2					
POZO	1					
DOPEL	1					
VADAM3	1					
CEDELL	1					
					Comments:	
REMEMBER INFORMATION						
Substrate:	Effort	Canopy:	QE Code:	Reference ID:		
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or		
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific		
3 = Sand w/Silt		3 = 21-60%	2 = Genes suspected	location of a species;		
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map		
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
	Overall Surface Cover	Abundance:	Voucher:			
	N = Nonrooted floating	1 = < 2%	0 = Not Taken			
	F = Floating, rooted	2 = 2-20%	1 = Taken, not verified			
	E = Emergent	3 = 21-60%	2 = Taken, verified			
	S = Submersed	4 = > 60%				

[illegible]



Aquatic Vegetation Plant Bed Data Sheet						Page <u>4</u> of <u>12</u>	
State of Indiana Department of Natural Resources							
ORGANIZATION: <u>Deward Lake</u>				DATE: <u>6/18/06</u>			
SITE INFORMATION				SITE COORDINATES			
Plant Bed ID: <u>54</u>	Waterbody Name: <u>Deward Lake</u>			Center of the Bed			
Bed Size: <u>36,000</u>	Waterbody ID:			Latitude: <u>N 41 22.066</u>			
Substrate: <u>2</u>	Total # of Species: <u>5</u>			Longitude: <u>W 85 46.561</u>			
Marl? <u>0</u>	Canopy Abundance at Site			Max. Lakeward Extent of Bed			
High Organic? <u>1</u>	S: <u>4</u>	M: <u>-</u>	F: <u>-</u>	Latitude: <u>N 41 22.095</u>			
				Longitude: <u>W 85 46.588</u>			
SPECIES INFORMATION							
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;">Individual Plant Bed Survey</div> 		
<u>MY: P2</u>	<u>4</u>						
<u>CHAD8</u>	<u>2</u>				<div style="text-align: center;">Comments:</div>		
<u>POIL</u>	<u>2</u>						
<u>CEDE4</u>	<u>2</u>						
<u>POIR3</u>	<u>1</u>						
REMINDER INFORMATION					<div style="text-align: center;">Reference ID:</div> <div>Unique number or letter to denote specific location of a species; referenced on attached map</div>		
Substrate:	Marl	Canopy:		QE Code:			
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined			
2 = Silt w/ Sand	0 = absent	2 = 2-20%		1 = Species suspected			
3 = Sand w/ Silt		3 = 21-60%		2 = Genus suspected			
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown			
5 = Gravel/Rock	1 = Present	Abundance:		Voucher:			
6 = Sand	0 = absent			0 = Not Taken			
Overall Surface Cover				1 = Taken, not verified			
N = Nonrooted floating		2 = 2-20%		2 = Taken, voucher			
F = Floating, rooted		3 = 21-60%					
E = Emergent		4 = > 60%					
S = Submersed							

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Aquatic Weed Control

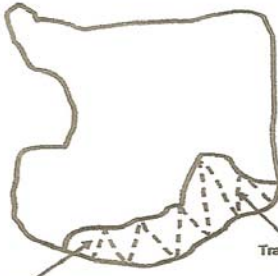
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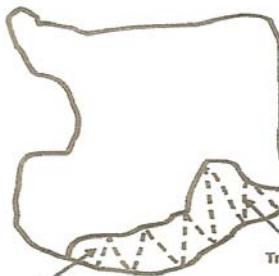
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Aquatic Vegetation Plant Bed Data Sheet						Page <u>11</u> of <u>12</u>	
State of Indiana Department of Natural Resources							
ORGANIZATION: <u>Dewart Lake</u>				DATE: <u>6/18/06</u>			
SITE INFORMATION				SITE COORDINATES			
Plant Bed ID: <u>511</u>	Waterbody Name: <u>Dewart Lake</u>			Center of the Bed			
Bed Size: <u>25</u>	Waterbody ID: <u>5</u>			Latitude: <u>N 41° 22.494</u>			
Substrate: <u>1</u>	Total # of Species: <u>5</u>			Longitude: <u>W 85° 46.721</u>			
Marl? <u>0</u>	Canopy Abundance at Site			Max. Lakeward Extent of Bed			
High Organic? <u>1</u>	S: <u>4</u>	M: <u>-</u>	F: <u>-</u>	Latitude: <u>N 41° 22.494</u>			
				Longitude: <u>W 85° 46.758</u>			
SPECIES INFORMATION							
Species Code	Abundance	QE	Yr.	Ref. ID	Individual Plant Bed Survey 		
<u>MYSP3</u>	<u>4</u>						
<u>POPEL</u>	<u>1</u>				Comments:          		
<u>CHABA</u>	<u>1</u>						
<u>POCB3</u>	<u>1</u>						
<u>POTL</u>	<u>1</u>						
REMINDER INFORMATION							
Substrate:	Marl	Canopy:		QE Code:			Reference ID:
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined			Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%		1 = Species suspe			letter to denote specific
3 = Sand w/Silt		3 = 21-60%		2 = Genus suspected			location of a species;
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown			referenced on attached map
5 = Gravel/Rock	1 = Present						
6 = Sand	0 = absent						
Overall Surface Cover		Abundance:		Voucher:			
N = Nonrooted floating		1 = < 2%		0 = Not Taken			
F = Floating, rooted		2 = 2-20%		1 = Taken, not verified			
E = Emergent		3 = 21-60%		2 = Taken, verified			
S = Submersed		4 = > 60%					



Aquatic Vegetation Plant Bed Data Sheet						Page <u>12</u> of <u>12</u>	
State of Indiana Department of Natural Resources							
ORGANIZATION: <u>Dewart Lake</u>			DATE: <u>6/18/06</u>				
SITE INFORMATION			SITE COORDINATES				
Plant Bed ID: <u>612</u>	Waterbody Name: <u>Dewart Lake</u>		Center of the Bed				
Bed Size: <u>2 acres</u>	Waterbody ID: <u>5</u>		Latitude: <u>N41 22.409</u>				
Substrate: <u>1</u>	Total # of Species: <u>5</u>		Longitude: <u>W85 47.025</u>				
Marl? <u>0</u>	Canopy Abundance at Site		Max. Lakeward Extent of Bed				
High Organic? <u>1</u>	S: <u>11</u> St: <u>-</u> F: <u>-</u> E: <u>-</u>		Latitude: <u>N41 22.430</u>				
			Longitude: <u>W85 47.050</u>				
SPECIES INFORMATION							
Species Code	Abundance	QE	Vchr.	Ref ID	Individual Plant Bed Survey 		
<u>MYSP2</u>	<u>3</u>						
<u>NAEL</u>	<u>2</u>				Comments:		
<u>CHARA</u>	<u>2</u>						
<u>POTL</u>	<u>1</u>						
<u>POCK3</u>	<u>1</u>						
REMINDER INFORMATION					Reference ID: Unique number or letter to denote specific location of a species; referenced on attached map		
Substrate:	Marl	Canopy:		QE Code:			
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined			
2 = Silt w/ Sand	0 = absent	2 = 2-20%		1 = Species suspected			
3 = Sand w/ Silt		3 = 21-60%		2 = Genus suspected			
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown			
5 = Gravel/Rock	1 = Present						
6 = Sand	0 = absent						
Overall Surface Cover		Abundance:		Voucher:			
N = Nonrooted floating		1 = < 2%		0 = Not Taken			
F = Floating, rooted		2 = 2-20%		1 = Taken, not verified			
E = Emergent		3 = 21-60%		2 = Taken, verified			
S = Submersed		4 = > 60%					

## 16.9 IDNR Aquatic Vegetation Permit



# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R4 / 2-04)

Approved State Board of Accounts 2004

☐ Whole Lake      ☒ Multiple Treatment Areas

Check type of permit

**INSTRUCTIONS:** Please print or type information

FOR OFFICE USE ONLY
---------------------

License No.

Date Issued

Lake County

Return to: Page 1 of  
DEPARTMENT OF NATURAL RESOURC  
Division of Fish and Wildlife  
Commercial License Clerk  
402 West Washington Street, Room W2  
Indianapolis, IN 46204

FEE:	\$5.00
------	--------

[illegible]

Treatment Area #	LAT/LONG or UTM's	
Total acres to be controlled	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s)	Late May early June / Mid July / late August
Treatment method:	<input type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical	
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.		
Plant survey method: <input type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify)		
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.		
Applicant Signature	Date	
Certified Applicant's Signature	Date	
FOR OFFICE ONLY		
<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	Fisheries Staff Specialist	
<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	Environmental Staff Specialist	
Mail check or money order in the amount of \$5.00 to: <b>DEPARTMENT OF NATURAL RESOURCES</b> DIVISION OF FISH AND WILDLIFE COMMERCIAL LICENSE CLERK 402 WEST WASHINGTON STREET ROOM W273 INDIANAPOLIS, IN 46204		

